Photo Lamp and Lightbox

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TOOLS:

- Countersink drill bit (1)
- Hack saw (1)
- Hand saw (1)
- Phillips 2 Screwdriver (1)
- Sandpaper (1)
- Spade or Hole Bit (1)

  For cutting 1" holes in the MDF

- Standard drill bits (1)
- hand electric drill (1)

PARTS:

- Lightbulb (4)
- Lamp holder (4)
- Electrical cable (5m)
- Terminal strip (1)
- Power plug (1)
- Cable clamp (5)
- MDF sheet (1)

  About 1m x 1.5m

- Beading (3m)
- Acrylic plastic (1)

  Measure this up after you have constructed the case

- Screw (50)
- Wood Glue or Epoxy (1)

SUMMARY

I shoot a lot of still life and product photography, where a good light source is essential.

On-camera flashes are almost useless, even bounced off the ceiling. Off-camera flashes and triggering systems are expensive. Natural light is unpredictable, uncontrollable and often unavailable. With the advent of cheap, low-power bulbs ('Compact Fluorescent', 'CFL', or 'energy saving' bulbs), continuous — as opposed to flash — studio lighting has become quite affordable, but a two lamp system with tripods will still set you back £200-300.

So I thought I'd make my own lamp using cheap CFL bulbs you can get from any DIY store or supermarket. These aren't the more expensive 'daylight' bulbs that aim to match the white balance of natural light, but they're a lot cheaper and can be swapped out for daylight bulbs at a later date.

For the full background on this project, see my previous version.

I wanted to try another one because one light just isn't enough, and I thought I could improve on my previous design.

This version has a switch on the cord so it's easier to control. It is white inside rather than being lined with foil, which reduces the amount of conductive metal (and therefore risk of electrocution). It has proper fixtures for the perspex screen which make it secure, but still removable. And it's black, which makes it less prone to showing up as a reflection in my shots, and looks cooler.

For all the original photos, see my flickr set here.

Functional overview

Essentially, this lamp consists of 4 × 15W energy saver bulbs (about 75W each equivalent in tungsten bulbs), wired in parallel and enclosed in a reflective box with diffusion screen.

## Step 1 — Wire up the terminal strip in parallel
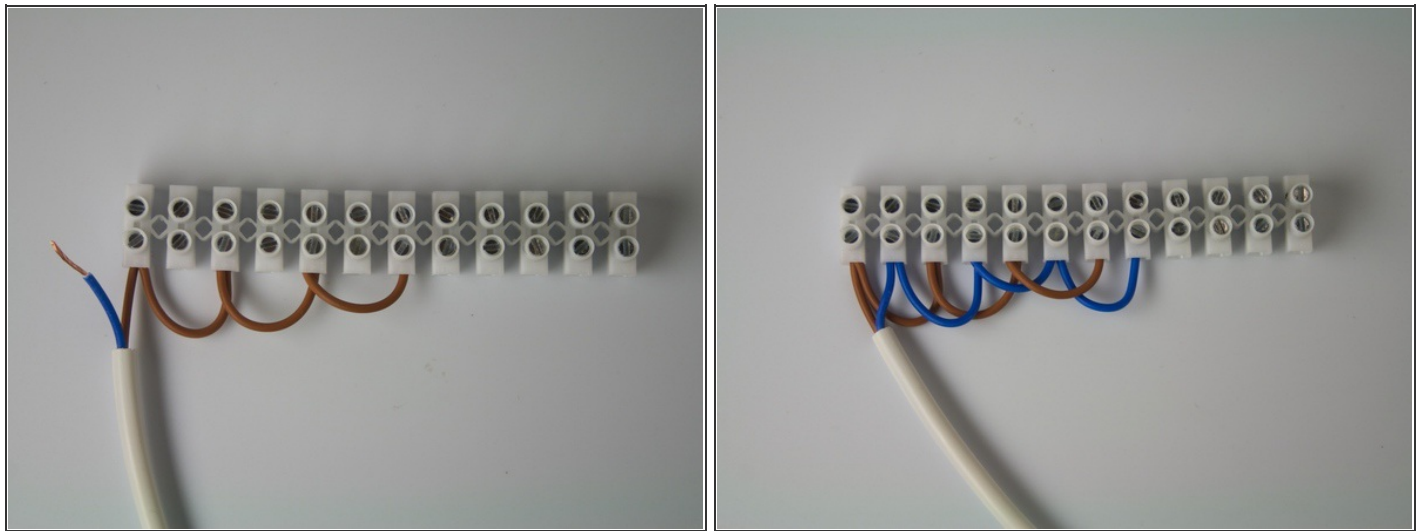
- Parallel is the key word here. Wired this way, all the bulbs draw full power from the supply and operate at full brightness. For the purposes of safety and component specification, this means that your power draw and current will be a factor of the number of bulbs used, in my case, 60 Watts (= 4 × 15W) and 1/4 Amp (= 4 × 15W ÷ 240V).

- Cut a short length of your mains cable, about 1'. This is the short piece that protrudes from the casing. At the end of the project, you will wire this up to the switch and then a longer piece of cable to plug into the wall.

- Connect this cable to the first two blocks on one side of the terminal strip, (live to the left, neutral to the right), then daisy-chain each wire out to alternate blocks, until you have wired up enough for all your bulbs (4 pairs of blocks in my case).

- It's easiest to wire up all the live points and then all the neutral points.

Step 2 — Wire up the bulbs to the terminal strip

- Cut 4 more pieces of flex, one for each lightbulb, allowing a slightly longer cable for each lamp as it will be placed further away from the terminal strip when fitted. Mine were about 8" to 16" roughly.
- Wire each of these up to a lamp holder.
- Then connect each lamp holder to the other side of each pair of points on the terminal strip.
- When you have all four lamps connected, you're ready to fit the electrical assembly into its holding plate.

Step 3 — Cut the holding plate
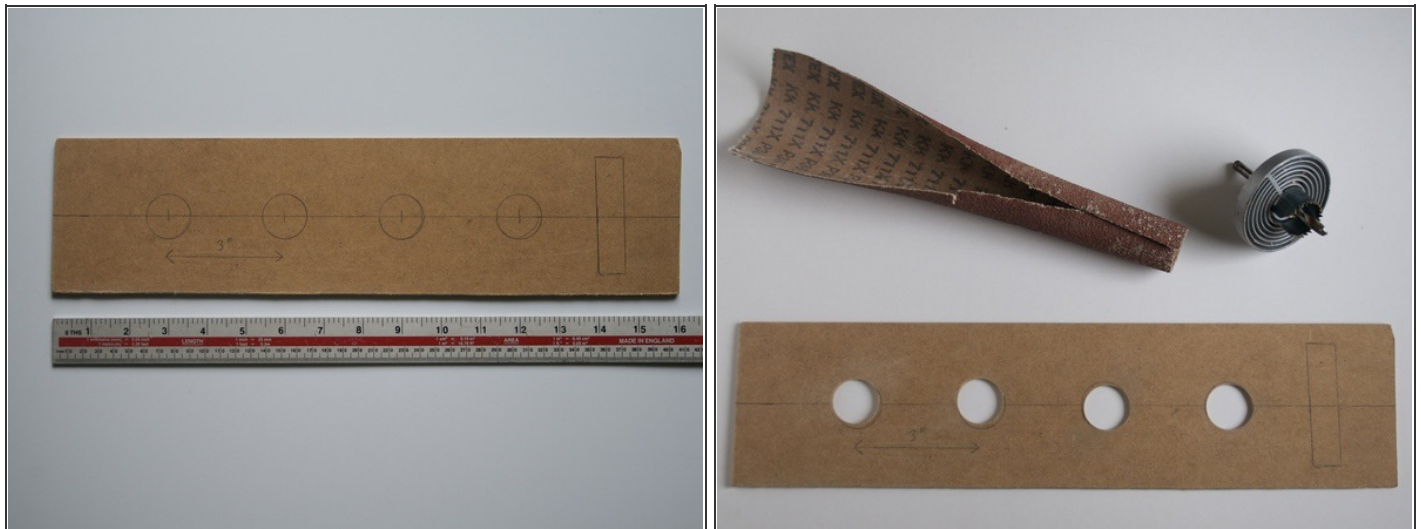
- The lamp holders have two plastic sleeves designed to hold a lamp shade. However, we can make use of them to fit the bulbs into a plate which will then be mounted into a box. The terminal strip can also be mounted onto this plate.

- Decide how big your box will be. Mine was about 16" wide, 13" long (along the length of the bulbs) and 4" high. This gave me enough room to fit four bulbs with adequate spacing, plus the terminal strip, with space in front of the holding plate for the bulbs themselves, and space behind (about 4") for the wiring.

- Cut your holding plate from the MDF. It will need to be thin enough to allow the sleeves of the lamp holders to screw down securely. (I used 1/8" MDF).

- Mark out on the MDF where your lamp holders and terminal strip will go. I allowed 3" space between the central points of each bulb, giving about 1½" space between each bulb when fitted.

- Drill holes for the lamp holders using a hole saw or spade bit. Better to create holes a little on the small side and then open them up with sand paper than drill them too large. You want a snug fit for the lamp holders.

- My MDF was white on one side. If yours is just plain uncoated MDF, now would be a good time to paint one face of it white to make it more reflective.

Step 4 — Fit the bulbs into the holding plate
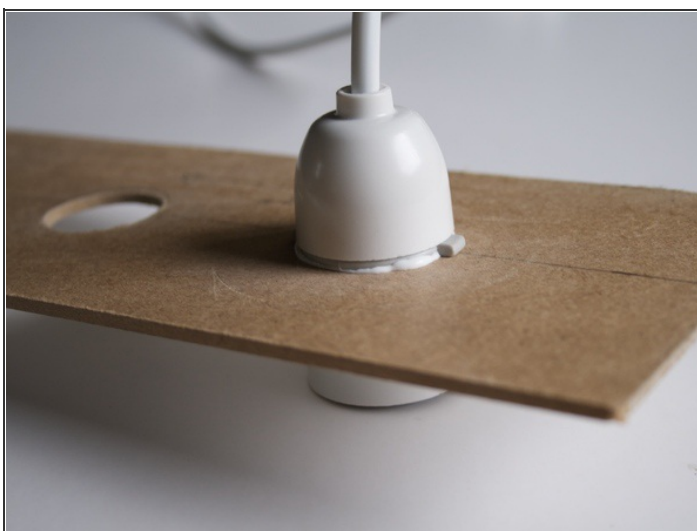
- Remove the sheaths from the front of each lamp holder (the part that you would normally use to clamp the lamp shade). Apply wood glue to the thread that you have just exposed.

- Push each lamp holder into the holes you cut in the MDF, with the white face of the MDF facing forward. Put the lamp holder with the shortest flex closest to where your terminal strip will be, moving further away with each longer flex.

- Screw the sheaths back on to the lamp holders on the other side of the panel.

Step 5 — Fit the terminal strip to the holding plate
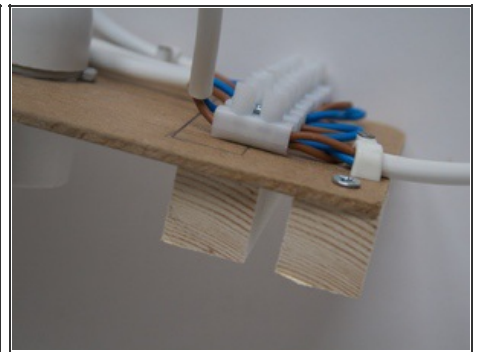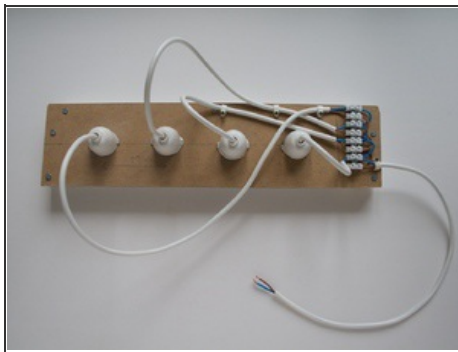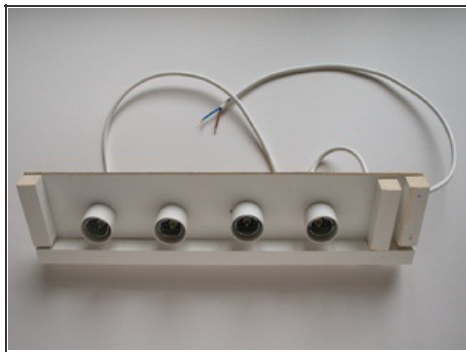
- You still need to secure the terminal strip and clamp the loose wires down. This is easier done once you have put wooden beading onto the panel. Because MDF is composed of compressed dust, you can't hold it together with screws. The screw head will hold a sheet of MDF securely, but only when the thread is screwed into something that will grip it, like wooden beading.

- This holding plate needs four pieces of beading: one 16" piece along the top, that the screen will rest on, one 3" piece down each side, that you will use to secure the plate to the side panels, and one 3" piece on the other side of the terminal strip, that will allow you to fix the terminal strip to the plate.

- The lengths of these pieces are only sometimes important! The piece along the top needs to be exactly the same length as the holding plate, as it will be used to screw the side panels onto. Similarly the side pieces need to butt up exactly against the bottom and sides of the holding plate as they will also be used to screw it onto the bottom and side panels.

- The photo shows the plate flipped over (and hence upside down) so you can see the front.

- When positioning the terminal strip, remember to allow room for the cable to exit the case. In my case, that meant putting the strip right up against the top of the panel and securing the top 16" piece of beading on by screwing through the end hole of the terminal strip (then through the MDF and into the beading).

- Screw two of the shorter pieces down each side, make sure the ends are flush with the bottom of the plate.

- It's quite difficult to screw into the MDF, so I first drilled short guide holes through this layer and just into the wooden beading.

- Screw the third short piece under the terminal strip, pinning the strip onto the MDF and beading

- Using the cable clamps, pin down each of the cables to the MDF, making sure each nail goes through into a piece of beading for a secure fit. This will help stop the lamp flexes putting strain on the connections in the terminal strip. I found that these sprung out quite easily during this part of the project.

- Secure the mains cable to the panel with a cable clamp. You can see in my picture that I would have benefitted by leaving a little more room for this clamp next to the terminal strip.

Step 6 — Cut the case

- You will need to cut 6 more pieces of MDF or wood for the case, plus 1 piece of translucent plastic. Because the exact dimensions of the case may change sightly as you make it, it's easier to have the plastic screen cut after you've made it, so you can measure it up exactly:
  - Bottom 16" x 12 1/2"
  - Front 16" x 4 1/8"
  - Back 16" x 4 1/8"
  - Sides: 12 3/4" x 4 1/4"
  - Top: 16 1/4" x 4 1/2"
  - Plastic screen: dimensions TBC

- These measurements assume you're using 1/8" thick material to make a box 16" × 13" × 4". You will have to adjust these depending on how you want your pieces to fit together, i.e. whether you want the top to overlap the sides, or the front to overlap the top, etc.

- In my arrangement:
  - The holding plate is the full width of the bottom panel, but enclosed by the sides
  - The front and the back both overlap the bottom
  - The side panels go on next, so they overlap the front, back and bottom
 - The top overlaps the sides and

back, and extends from the back to beyond the holding plate, leaving about 1/8" of beading showing to rest the screen on

Step 7 — Fit the beading and assemble the case

- Every panel needs to be attached to its neighbours by screwing the beading to one panel, then screwing the second panel onto the beading. You don't have to follow these instructions exactly. Essentially, you just need enough beading to fit all the panels together securely.

- You might be surprised how much beading you use. 3 metres should be sufficient if you're economical.

- You will need to drill a guide hole for each screw, and then a countersink hole. This makes for a cleaner finish, and you can slide the box around on delicate surfaces without scratching them. But it does take a long time.

- You want to secure the panels together with screws at the corners and distributed along each side. You may find yourself cursing, particularly at the corners, as you find you want to fit several screws into the same place. Just take your time, and think about how the whole thing will fit together as you attach each piece.

Step 8 — Bottom panel
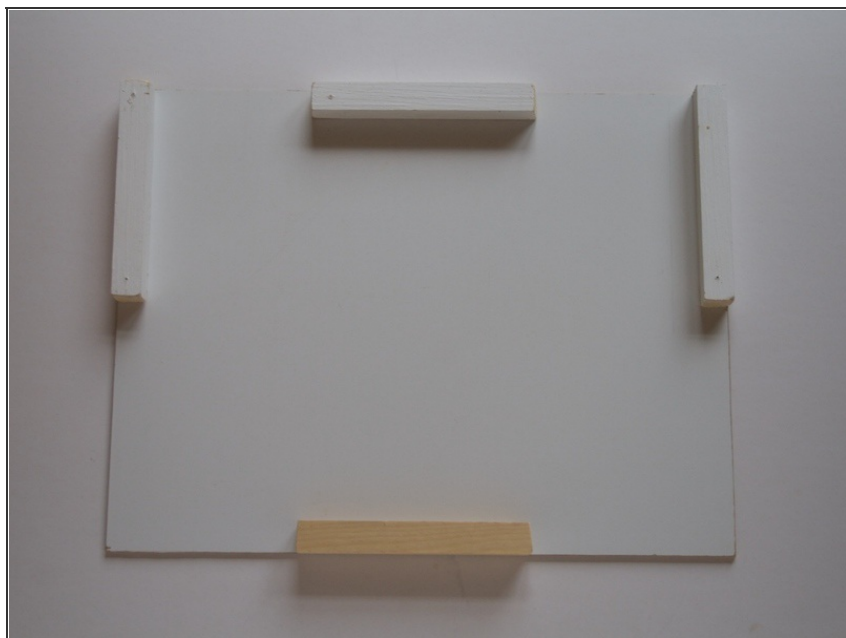
- Cut 4 x 6" pieces of beading
- Fit the side pieces flush with the front of the box
- Fit the front and back roughly in the middle of each edge, without a gap
- The back would actually be better with a piece running the full width (I didn't do this as I was trying to save beading, but you'll see in later steps I added some extra beading to make a stronger fit).
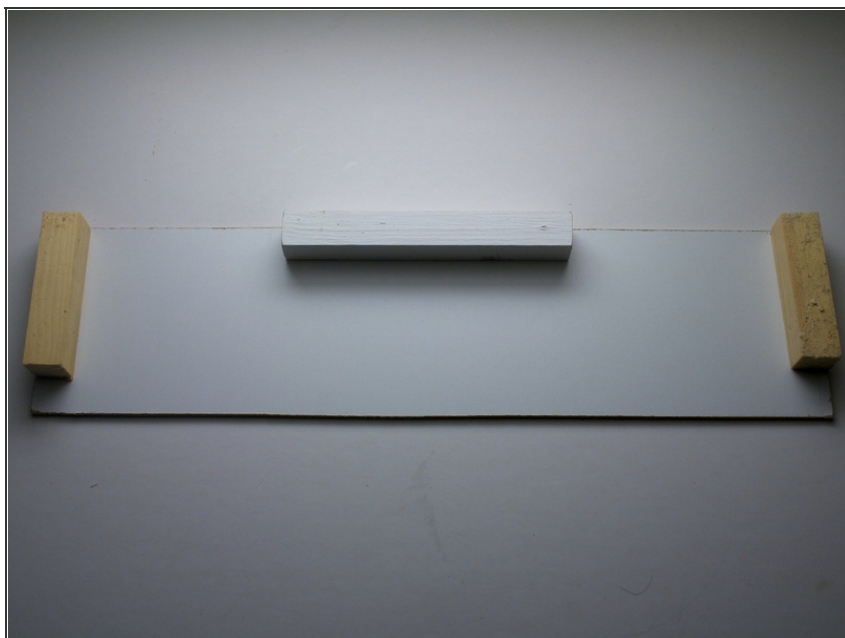
Step 9 — Front

- Cut 2 x 3" pieces of beading. Screw to the two short sides, flush with the top of the panel, no gap.
- Try and get a clean straight cut at the top ends, as this will be facing up, and the screen will rest on these ends
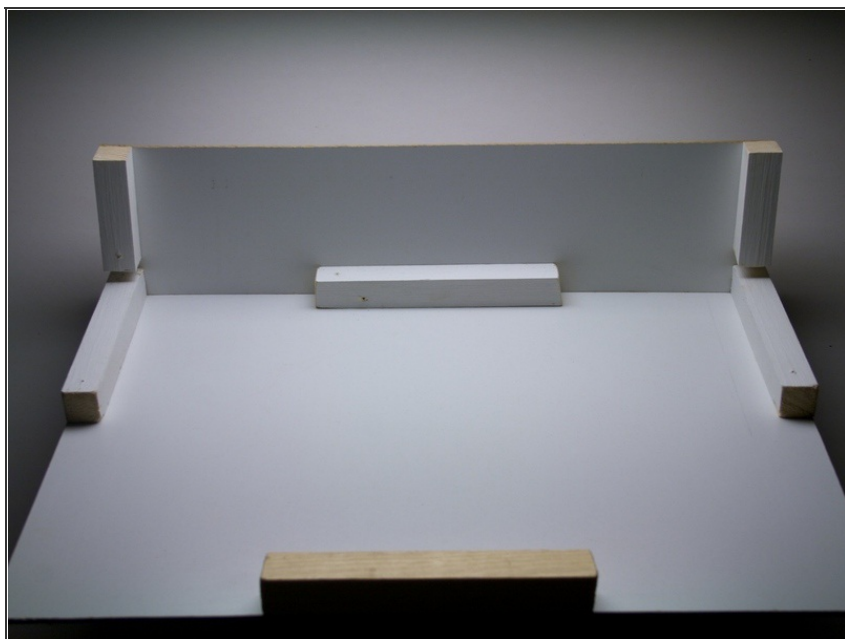
Step 10 — Back

- Cut 2 x 3" pieces of beading. Screw to the two short sides, flush with the top of the panel, no gap.

- Try to get a clean, straight cut at the top ends, as the top wooden panel will be screwed into these.

- Cut 1 x 6" piece of beading. Screw to the top edge, flush, roughly in the middle

Step 11 — Screw the front to the bottom

- This sits so the front panel covers the front edge of the bottom panel.

- Make sure to leave space for the screws already in. It can help to screw at a slight angle if you're pushed for space

Step 12 — Screw the back to the bottom

- This sits so the back panel covers the back edge of the bottom panel

Step 13 — Screw the holding plate to the bottom

- The back face of the holding plate is about 3 3/4" from the back of the bottom panel. When positioning this panel, it's helpful to test it out with the top wooden panel too. You want a short enough distance between the back panel and the holding plate to allow you to screw the top wooden panel onto the beading along the top of the holding plate.

- But you also want to leave a small ledge of beading exposed to rest the plastic screen on.

Step 14 — Sides

- Screw on the side panel for the side without the power cable.
- Drill a hole in the second side panel aligned with the power cable. Thread the cable through and screw on this side too.

Step 15 — Wire up the switch

- Wire your 1' length cable from the case to the switch. Wire the switch to the longer length of cable. Wire the longer length to the plug
- If you want to test it at this point, know the risks. You are playing with mains electricity, and if you touch any part of the assembly before closing the case, you could easily electrocute yourself. Make sure to unplug it before going any further.

Step 16 — Fit the top wooden panel

- This covers up all the electrical components.

Step 17 — Seal and paint the case

- I filled in some of the cracks with PVA wood glue and then painted the case black. I also touched up some of the white paint inside to make it more reflective.

Step 18 — Fit the plastic screen

- Now you can measure the size of plastic you need and get it cut exactly to size. You might want to experiment with different levels of transparency. There is a tradeoff between an even diffusion of light and reduced brightness.

- You can also experiment with different power bulbs. Again, there is a tradeoff; this time between heat and brightness.

- I used 2 mirror corners to fix the screen to the top front corners of the box, leaving a friction fit along the opposite side so I can remove the screen if necessary.

Step 19 — Application
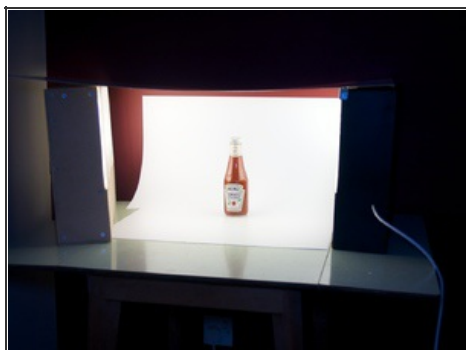
- The bulbs I'm using are not daylight bulbs. They have a colour temperature of about 2700-3000K. You need to adjust your white balance accordingly. I find that the tungsten setting in camera works pretty well.

- I use a sheet of flexible plastic about 20" x 30" as an infinity wall for small objects, with one of these lamps on each side. I can also lay a sheet of white card across the top to reflect more light down if necessary.

- For larger objects, I use a 2m length of white curtain blackout material, which is laminated with plastic on one side so it drapes well, and is less prone to creasing. The lamps work much better for smaller objects.

I hope you find this project useful. I bootstrapped this project: lighting the steps with an earlier photo lamp I had made. Now I can photograph subsequent projects even better, as I have two lamps.

Any feedback is much appreciated. Thanks.

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